

NO-A177 021

WORLDWIDE AIRBORNE COMMAND POST OPERATOR COMPUTER-BASED
TRAINING; PLATO IMPLEMENTATION PLAN(U) AKHAN ASSOCIATES
INC SILVER SPRING MD 31 JAN 06 F49642-04-D-0039

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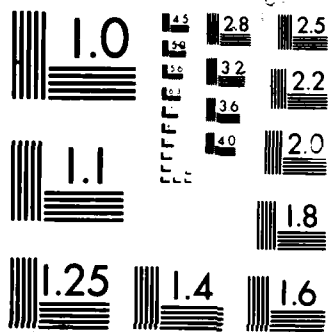
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PLATO IMPLEMENTATION PLAN

WORLDWIDE AIRBORNE COMMAND POST OPERATOR COMPUTER-BASED TRAINING

AD-A177 821

31 JANUARY 1986

PREPARED FOR:
HQ USAF/DPPT
DIRECTORATE OF PERSONNEL PROGRAMS
TRAINING PROGRAMS DIVISION

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Signature	
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INTRODUCTION

The Directorate of Personnel Programs, Training Programs Division (HQ USAF/DPPT) contracted the development of an Implementation Plan for the Worldwide Airborne Command Post (WWABNCP) Operator Computer-Based Training to Akman Associates, Inc. The project commenced 1 June 1985 under Contract No. F49642-84-D0039-0002.

This report is the second of three reports which together will provide the Air Force with a comprehensive implementation plan for the PLATO/SPIRITUS Training System¹. The first report, the Decision Paper, provided a training product analysis and a user requirements summary. The third and final report will describe a plan for the life cycle management of the training system, including a plan for the future maintenance of software, and responsibilities for system management and for monitoring/feedback.

¹ Throughout this report, the PLATO/SPIRITUS Training System is referred to as the training system.

CHAPTER 1 OVERVIEW

PURPOSE

The purpose of this report is to present information to Air Staff decision-makers for use in determining whether or not to accept transfer of the PLATO/SPIRITUS Training System from the Defense Communications Agency (DCA). The report will also propose a plan for the initial integration of the training system into the Air Force.

This report describes the issues, potential problems, strategies, and responsibilities affecting system transfer and Air Force integration. Alternative strategies and options are proposed when warranted. A plan of implementation tasks, responsibilities and dates for system transfer decision actions and Air Force integration actions is presented. Finally, funding projections, funding assumptions, and sample funding documentation are included.

IMPLEMENTATION PHASES

The various phases of implementation of the training system are presented in Figure 1-1. The first five phases as shown in Figure 1-1 have already been accomplished. Currently the training system is in the trial phase of execution. Air Force sponsored implementation analysis and planning are underway. Although courseware development was supposed to be completed by 31 October 1985, two additional courses, ARC-171 and Trailing Wire Antenna (TWA), are being developed as an expansion to previously planned courseware development; their expected completion date is 1 April 1986.

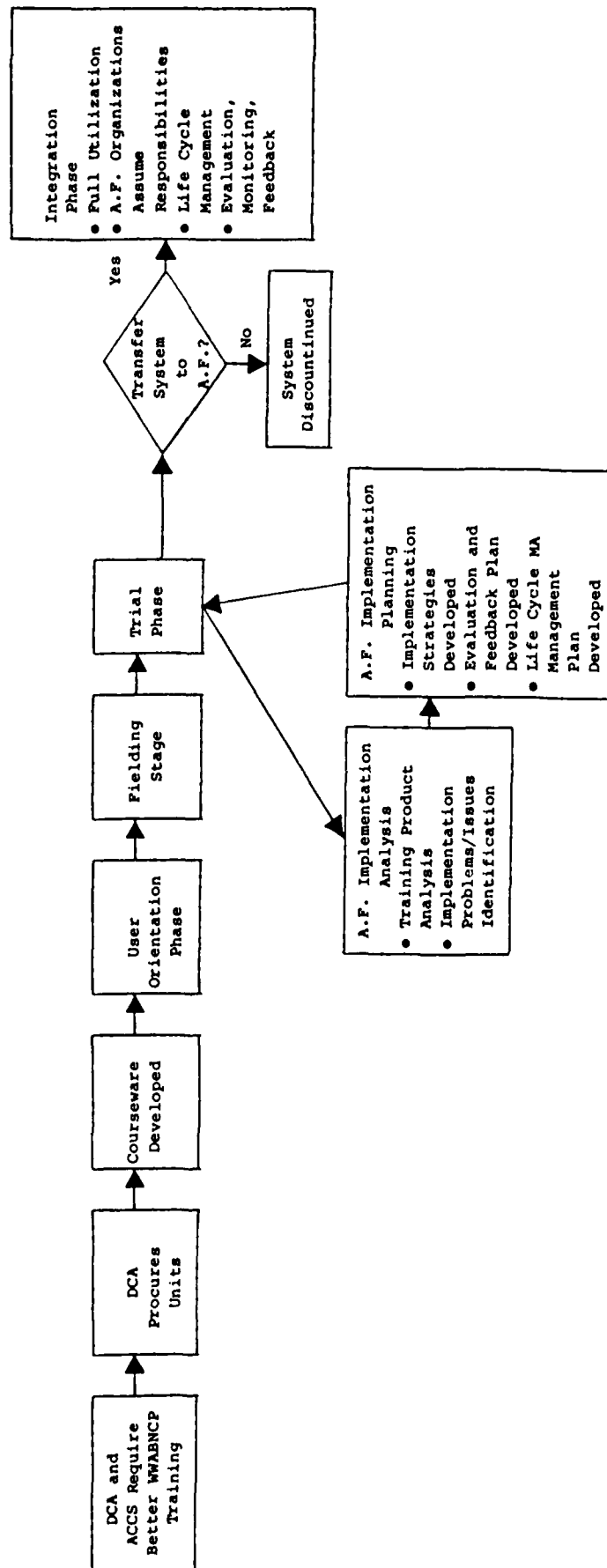
CURRENT TRIAL PHASE

During the current trial phase users have been identifying and documenting start-up problems and successes. They have communicated this information and lessons learned to each other, Headquarters, Strategic Air Command (HQ SAC), Defense Communications Agency (DCA), and the implementation analysis and planning staff. Since the receipt of most of the courseware is so recent, users are still experiencing some start-up problems; they are still learning about the training system's capabilities and potential for training. Because of this, the trial phase is not yet completed. This report is based on trial information of functional users of the training system.

Air Staff must either agree to accept the transfer of the training system from DCA and institutionalize it or discontinue its use to complete the trial phase and possibly enter the integration phase. The Air Force will be making a formal commitment to provide the necessary resources and organizational management

FIGURE 1-1

OVERVIEW OF PLATO/SPIRITUS
TRAINING SYSTEM IMPLEMENTATION



if they decide to accept the system. This involves providing support to maintain, operate, and when warranted, upgrade or expand the training system. The Air Force has not yet made a formal decision concerning system transfer.

GOALS OF INTEGRATION PHASE

The goals of the integration phase reflected in Figure 1-1 are briefly stated as:

- Ensure full utilization of the training system ;
- Assign Air Force organizational responsibilities, including program management, support, and system maintenance;
- Engage in the life cycle management of the training system, with adherence to Air Force policy and procedures concerning automated training systems; and
- Evaluate the effectiveness and efficiency of the training system through ongoing monitoring and feedback.

ORGANIZATION OF REPORT

Chapters 2, 3, and 4 provide discussions of the issues and potential problems that could affect the transfer decision of the PLATO/SPIRITUS Training System and initial Air Force integration. These issues or potential problems are followed by proposed strategies for resolving them. In Chapter 5 short-term strategies appear as action items in order of their proposed tasking sequence. Long-term strategies will be dealt with in the Life Cycle Management report.

Chapter 2 presents organizational issues and strategies. Chapter 3 consists of hardware/software requirements issues and strategies, while Chapter 4 deals with implementation issues and strategies. Chapter 5 provides an implementation plan with tasks, responsible organizations, and dates for training system transfer and initial Air Force integration actions.

A sample Program Decision Paper, Background Paper, Cost Summary, and a detailed explanation of underlying assumptions and cost estimates are found in Appendix A. Appendix B contains cost comparisons between the PLATO Personal Training Station (PPTS) and the existing Viking and SPIRITUS equipment.

CHAPTER 2 ORGANIZATIONAL ISSUES

INTRODUCTION

The purpose of this chapter is to describe the major roles and relationships proposed for the Air Force organizations involved in operation and support of the PLATO/SPIRITUS Training System. The issues addressed in this chapter are:

- Responsibilities that should be accepted by each of the organizations that operate and support the training system;
- Requirements to orient involved organizations on their roles; and
- Requirements for training unique to the 1st Airborne Command and Control Squadron (ACCS).

ROLES AND RELATIONSHIPS OF AIR FORCE ORGANIZATIONS

This section describes the major roles of organizations involved in the implementation and life cycle management of the training system. Figure 2-1 and Table 2-1 summarize these major roles.

HQ USAF Organizational Roles

The Directorate of Systems Management, Command and Control Systems Division (HQ USAF/SIMC) is the Air Staff office of primary responsibility (OPR) for the training system. AF/SIMC is concerned with how the training system impacts the effectiveness of the Worldwide Airborne Command Post Communications Systems. As the OPR at the Air Staff level, AF/SIMC deals with overall policy and funding decisions for training system issues. When questions arise on the acquisition or use of the training system that also affect WWABNCP communications, and require funding or policy decision/formulation, AF/SIMC will provide guidance and actions.

The Directorate of Personnel Programs, Training Programs Division (HQ USAF/DPPT) is an Air Force staff office of collateral responsibility (OCR) for the training system. As part of its functional responsibilities as an OCR, AF/DPPT has been designated to provide funding oversight and policy formulation for the implementing organizations. When modifications are required to keep the training system current, AF/DPPT will issue policy guidance on the conduct of the modifications, and make decisions on levels and timeframes for funding actions.

The Directorate of Space Systems, Command, Control and Communications, Strategic Division (HQ USAF/RDSS) is also an office

FIGURE 2-1

ORGANIZATIONAL INTERESTS
IN THE PLATO/SPIRITUS TRAINING SYSTEM

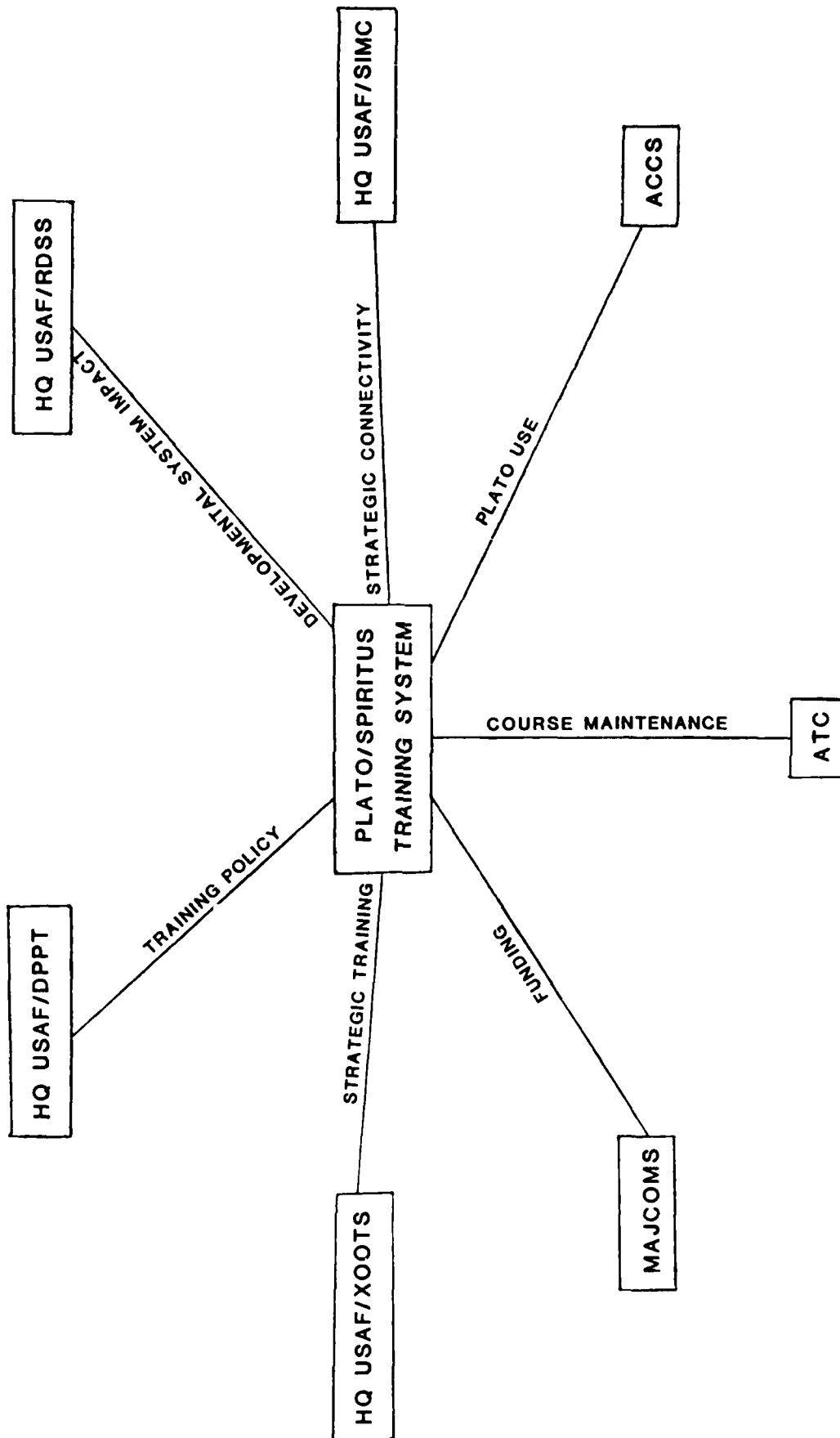


TABLE 2-1
ORGANIZATIONAL ROLES IN
PLATO/SPIRITUS TRAINING SYSTEM

ORGANIZATION	RELATIONSHIPS	IMPLEMENTATION FUNCTIONAL ROLES
HQ USAF/SIMC	AF/SIMC is concerned with how PLATO/SPIRITUS improves and maintains strategic command and control effectiveness.	AF/SIMC acts as the HQ USAF office of primary responsibility (OPR) and provides funding and policy decisions as they apply to strategic command and control.
HQ USAF/DPPT	AF/DPPT is concerned with PLATO/SPIRITUS as a training system and in the instructional aspects of PLATO operation.	AF/DPPT acts as a HQ USAF office of collateral responsibility (OCR) and provides funding and policy decisions on the maintenance and upkeep of PLATO/SPIRITUS instructional courseware.
HQ USAF/RDSS	AF/RDSS is concerned with new strategic command and control systems which will ultimately impact PLATO/SPIRITUS hardware and software.	AF/RDSS, as a HQ USAF OCR, will provide advance information on new strategic command and control systems that will impact PLATO/SPIRITUS and help assess the degree of change that new systems will have. AF/RDSS will help to arrange funding to applicable programs when minor changes are required.
HQ USAF/XOOTS	AF/XOOTS is concerned with operational training for strategic systems of which PLATO/SPIRITUS is a part.	AF/XOOTS is a HQ USAF OCR and will provide advance information when changes in operational training will impact PLATO/SPIRITUS use.
MAJCOMs (General)	SAC, TAC, PACAF, and USAFE are concerned with PLATO/SPIRITUS as a command-owned training asset.	MAJCOMs are primary conduits of funding for ongoing PLATO/SPIRITUS system operation, for maintenance of the units, and procurement of new equipment when required.
HQ SAC	HQ SAC is a PLATO/SPIRITUS-using MAJCOM with potential special requirements for unique equipment.	HQ SAC is responsible for developing documentation for TEMPEST approved equipment, and for funding such equipment if procured.
HQ ATC	HQ ATC is the implementing organization for the PLATO/SPIRITUS program.	HQ ATC is a program OPR for the PLATO/SPIRITUS, and is responsible for evaluating the impact on PLATO/SPIRITUS courseware of operation/equipment change. In addition, ATC will update courseware in cases where modification is required.
ACCS	The 1st, 2nd, 4th, 6th, 9th, 10th ACCS are the functional users of the /SPIRITUS system.	The ACCSs will be responsible for operating the PLATO/SPIRITUS system, integrating the system into unit training programs, reporting on PLATO/SPIRITUS effectiveness, and recommending improvements.

of collateral responsibility. As the policy and funding office for strategic Command, Control and Communications (C³), AF/RDSS is involved in the development of new systems that may impact WWABNCP communications, including the training system. AF/RDSS has the responsibility to inform the training system OPR (AF/SIMC) when significant changes in strategic C³ are to occur. AF/RDSS will help determine the impact of new or updated strategic C³ systems. In addition, AF/RDSS will arrange for funding when changes in strategic C³ systems make major modifications of the training system necessary.

The Deputy Director of Operations and Training, Strategic Division (HQ USAF/XOOTS) is also an Air Force OCR for the training system. As OCR, AF/XOOTS assists in determining the impact that changes in operational training procedures would have on the training system. Operational training resource requirements will be coordinated with AF/XOOTS during the integration phase to ensure that any long-term needs have been addressed. During the life cycle of the training system, AF/XOOTS will provide information and advice when operational training procedure changes will impact the training system. In addition, major changes to training system equipment that impact operational training will be staffed through AF/XOOTS.

MAJCOM Organizational Roles

There are two types of roles that major air commands (MAJCOMs) will play in support of the training system. The first applies only to the Strategic Air Command (SAC) and the Air Training Command (ATC). The second concerns the MAJCOMs of various Airborne Command and Control Squadrons (ACCSs).

If SAC determines that a TEMPEST approved training system is required, HQ SAC will be required to prepare an Information System Requirement Document (ISRD) to support the acquisition of the necessary hardware. This effort will be conducted in conjunction with the ACCSs that will be utilizing the equipment.

ATC is the program OPR for the training system. This is a different OPR responsibility from the Air Staff OPR, AF/SIMC. ATC/TTXB is program OPR and ATC/TTQE is program OCR. As program OPR and OCR, ATC has the responsibility to implement the training system program. ATC will act as the focal point and oversee the management of the system. ATC will seek ACCSs' input on all matters and issues, and will convene periodic meetings of ACCS SMEs to discuss pertinent issues and courseware content. ATC will evaluate potential changes to training system courseware required by Technical Order changes, WWABNCP operation changes, equipment modification/update, or monitoring and feedback results. ATC will assess the impact of the changes to determine if new hardware or software is required. If software modification is needed, ATC will determine if the modification will be performed in-house or if it will require contractor support. ATC will monitor contractor support.

ATC will receive and operate authoring stations, and will eventually develop routine updates to training system software. In cases where modifications to software are conducted in-house, ATC will develop the modifications with SME assistance from the ACCSs and will supply the various ACCSs with the updated courseware required. When training system issues arise that require either new hardware or significant software modifications, ATC will explore alternatives, and make recommendations to HQ USAF/DPPT.

The following MAJCOMs have responsibilities arising from their position as reporting headquarters of the 1st, 2nd, 4th, 6th, 9th and 10th ACCSs:

- Strategic Air Command (SAC);
- Tactical Air Command (TAC);
- Pacific Air Forces (PACAF); and
- United States Air Forces in Europe (USAFE).

The principal role of these MAJCOMs is providing hardware maintenance funding for the training system. MAJCOMs will be responsible for interfacing with HQ USAF and ATC and ensuring that training system resource requirements, when identified, are considered in the Planning, Programming and Budget System (PPBS). MAJCOMs have the ongoing requirement for procuring, assessing, and funding hardware maintenance contracts for the in-place systems.

Airborne Command and Control Squadron Roles

The 1st, 2nd, 4th, 6th, 9th and 10th ACCSs are the functional users of the training system. Their primary responsibility will be operation and upkeep of the system. The ACCSs will integrate the system with their respective unit level training programs, and utilize the training system for WWABNCP communication system operators.

The ACCSs also have the responsibility to provide requirements determination and evaluation and feedback documentation on the training system. Any requirements for new/updated courseware, replacement equipment, additional training stations, or other material requirements will be identified by the ACCSs and reported to the appropriate MAJCOM or ATC for necessary action. As the ACCSs gain experience with the training system, they will provide evaluation and feedback on the system to identify possible areas of improvement to system effectiveness.

SUPPORT ORGANIZATION ORIENTATION

Issue/Potential Problem

Many Air Force organizations playing a key role in system integration have not yet received formal orientation to the program. DCA primarily dealt with the ACCSs when developing and fielding the training system. Therefore MAJCOMs and ATC require orientation and preparation before assuming their roles in the program.

Strategy

The following are actions designed to resolve the support organization orientation issue.

1. MAJCOMs and ATC should receive copies of the three reports that comprise this implementation analysis and planning effort to inform them of the training system and their roles with respect to it.
2. DCA or HQ SAC should orient and brief ATC in the use, management and evaluation of the training system. (DCA project leader will be available until 21 February 1986.)

1ST ACCS UNIQUE TRAINING REQUIREMENTS

Issue/Potential Problem

The 1st ACCS has training requirements unique to other ACCSs using the training system. Because of its unique National Emergency Airborne Command Post (NEACP) mission, this unit operates more communications equipment than any other ACCS and has unique equipment, such as the AUTODIN terminal. It also has unique aircraft, the E-4B, and has a larger crew than other ACCSs.

Standardization of WWABNCP communications operator courseware has been and will continue to be a continuing concern to the 1st ACCS due to its unique training requirements. Separate lesson segments were developed by DCA in the training system courseware specifically for the 1st ACCS (checklists and the dual secure voice switchboard) since its training requirements for these were so different from the other ACCSs. Early lesson segments such as the AFSATCOM course were not consistent with 1st ACCS operating procedures. This caused difficulties since the trainees needed frequent verbal supplementation by the instructors.

Strategy

The following are actions designed to resolve the 1st ACCS' unique training requirements issue.

1. When 1st ACCS equipment and procedures are somewhat but not markedly different from other ACCSs, explicit references to these differences should be made in the standardized courseware. This may require occasional verbal supplementation by 1st ACCS instructors.
2. When 1st ACCS procedures or equipment are markedly different from other ACCSs, unique lesson segments should be developed if at all practicable, within time and funding constraints. These instances should be evaluated on a case by case basis.

CHAPTER 3

HARDWARE/SOFTWARE REQUIREMENTS ISSUES

INTRODUCTION

The purpose of this chapter is to describe the issues that have an impact on the hardware and software of the PLATO/SPIRITUS Training System. The chapter describes problems and advantages of the current training system and of the procurement of additional units. Appendix A provides the associated costs of hardware/software maintenance and improvements to the training system described in this chapter. Specifically this chapter addresses the issues of:

- Future hardware and software maintenance;
- Quality control of courseware;
- Procurement of additional hardware units; and
- Minor hardware and software enhancements.

FUTURE HARDWARE AND SOFTWARE MAINTENANCE

Issue/Potential Problem

Adequate courseware and hardware maintenance is critical to the successful implementation of the PLATO/SPIRITUS Training System. This maintenance includes routine changes to existing courseware, major new courseware developments which would also impact existing courseware, and maintenance of Control Data Corporation (CDC) and SPIRITUS equipment.

The frequency and magnitude of future routine courseware modifications are difficult to predict. Some ACCSS projected that Technical Order changes would occur as often as semi-annually, impacting roughly one-third of the courseware. HQ SAC, on the other hand, gave a much more conservative estimate based on its viewpoint that only JCS procedural changes or infrequent aircraft modifications or reconfiguration programs would necessitate modifications to courseware already developed. HQ SAC estimated that no courseware modifications were expected before PACER LINK II Technical Orders were issued. Given the cost and effort involved in modifying courseware, it is recommended that changes should be made to existing courseware only when significant procedural or equipment changes occur. Funding projections are discussed in Chapter 4 and presented in Appendix A.

Another courseware maintenance concern of users is that the process of developing new courseware to meet new aircraft modification or changing communication systems equipment requirements will be too slow and cumbersome to provide timely training. DCA

estimates that roughly six months are required to develop a completely new course. Estimates also indicate that between six months to one year of additional time may be needed to contract the work in open, competitive bidding. Therefore a minimum lead time of one year to 18 months would be needed to develop a new course under contracting procedures. ATC's assumption of a courseware developer role would greatly expedite courseware development since only six months lead time would be needed to develop a new course.

The main concern regarding hardware maintenance centers around the potential for off-site repairs. Contracts with CDC which offer on-site or off-site maintenance have generally been found satisfactory. However, some concern exists about the lack of SPIRITUS maintenance contracts. Some ACCSS feel the SPIRITUS equipment is especially liable to breakage and malfunction. To date the courseware developer, Electrospace Systems, Inc (ESI), and DCA have assisted ACCSS in troubleshooting hardware problems on both types of equipment and in sending equipment back to manufacturers if necessary. On 1 April 1986, however, ESI's contract expires. Manufacturer maintenance manuals from CDC and SPIRITUS and spare boards and common replacement parts for SPIRITUS equipment have been provided to the ACCSS. However, unfamiliarity with troubleshooting and preventive maintenance procedures by some users could cause problems. Some unauthorized repairs and changes on hardware equipment have already been attempted, thus jeopardizing warranties.

Because each ACCS has a single student PLATO/SPIRITUS training station, training would cease if hardware equipment was returned to the manufacturer for repair. SPIRITUS has only one repair site, their California headquarters, suggesting long delays if off-site maintenance is needed. USAFE especially faces an extended loss of its training unit when equipment is shipped for repairs or replacement parts are ordered.

Fowler Associates, Inc. (SPIRITUS) claims it will offer free repair advice over the phone (for instance, to suggest whether a spare board should be replaced). The company offers maintenance contracts at a cost of \$69.00 per month per unit, a fact hitherto unknown by the ACCSS. These maintenance contracts cover all repairs but do not offer on-site maintenance.

Strategy

The primary solution to most of the maintenance problems cited is adequate, ongoing software and hardware maintenance funding. Funding commitments for all types of system maintenance should be formally agreed to prior to a decision to transfer the system. This commitment would ensure that the system will be properly maintained and sustained in the future.

In addition to maintenance funding, the following actions are suggested.

1. ATC, in coordination with the MAJCOMs, appropriate Systems Program Offices (SPOs) and the Air Staff OPR and OCRs should ensure that adequate advance notice is obtained of Technical Order or equipment modification changes to permit timely courseware maintenance and modification developments.
2. MAJCOMs should fund and ACCSSs should carry CDC and SPIRITUS maintenance contracts, or MAJCOMs should commit to funding individual repairs as they occur.
3. If a hardware problem arises, the maintenance manuals should be referenced and/or a call to the manufacturer's service representatives for advice should be made. No unauthorized repairs should be made to the equipment under maintenance agreements.
4. The current courseware developer should provide a troubleshooting maintenance guide for users, written in non-technical terms.
5. The current courseware developer's SPIRITUS maintenance guide should be part of the documentation transferred to the Air Force.
6. The environment in which hardware is used and stored should be strictly regulated and enforced by ACCSSs to prevent careless damage to the equipment.
7. The addition of a second training unit at each of the ACCSSs would provide a backup unit should off-site repairs be needed. (The pros and cons of this recommendation are covered in a subsequent subsection on procuring additional units).
8. If SPIRITUS equipment proves to be unreliable or prone to repeated repairs, an alternative audiovisual PLATO interface, such as an interactive video disk system, should be considered. (This enhancement is discussed in the subsequent subsection on procurement of additional units.)

QUALITY CONTROL OF COURSEWARE

Issue/Potential Problem

A number of software quality control problems were identified during the trial phase of implementation. A reporting mechanism

was subsequently and effectively developed which brought these joint problems to the appropriate attention of the courseware developer and DCA. Since then virtually all of the software problems have reportedly been resolved by the courseware developer. Many lessons were learned about software quality control during the course of the trial period which are addressed in the strategy section.

The original plan for controlling the quality of courseware was not adequately effective. Under this original plan it was recognized that programming and subject material would have to undergo some sort of quality control before courseware finalization. The execution of quality control was a joint undertaking of the courseware developer and an Air Force Subject Matter Expert (SME), with the major responsibility resting with the courseware developer. According to the courseware developer, its responsibility concerned testing and debugging programmed lesson plans and conducting internal quality assurance reviews before courseware delivery. An Air Force SME acted as a final approving authority, working with the courseware developer to review and correct all courseware (though not reproduction quality) before finalization.

Many of the quality control problems were not obvious to the AF SME, however, at the time of editing. This may have been due to:

- Concentration on subject matter errors;
- Experience of the courseware developer in over-riding problems;
- Demands on the SME's time; and
- Appearance of problems only after daily usage of the courseware.

Courseware quality control is seen as a standard function of computer-assisted training management. Problems should decrease with time as users become more familiar with the training system, more adept at identifying problems that require immediate developer attention, and as the Air Force gains experience in exercising the training system's software contract monitoring function. Therefore quality control is not seen as posing any permanent difficulties should system transfer occur.

Strategy

The following are actions suggested to resolve the issue of quality control of courseware.

1. ATC should institute a plan for in-house courseware development and quality control after its assumption of the role of courseware developer.

2. ATC will use its computer-based training expertise to monitor and help prepare courseware development contracts and to select contractors.
3. ATC will ensure that configuration management is performed prior to courseware development contracting. Specifications and standards for software and documentation will be defined and clearly stated in Requests for Proposals, Statements of Work, and other contracting vehicles.
4. ATC will conduct courseware review in conjunction with AF SMEs during a quality review process.
5. Future courseware development contracts should allow for adequate AF review time.
6. In contracting courseware development, the Air Force should not be responsible for correcting quality control errors through programming, for programming subject matter changes, or for determining downloading or reproduction problems. These responsibilities belong to the courseware developer.
7. A contractor courseware developer should be held accountable for courseware problems until a specified period of time after courseware delivery, to allow for identification of problems that appear only after continued use.
8. A forum and/or reporting mechanism should be established by ATC. This would allow for the periodic communication of courseware quality control problems and discussion of present and future courseware development.

PROCUREMENT OF ADDITIONAL HARDWARE UNITS

Issue/Potential Problem

This subsection includes discussions on issues related to procurement of additional hardware units of the PLATO/SPIRITUS Training System. The advantages and disadvantages of adding more units and the impact on costs and management of the training system are included in the discussion. The following issues are covered in order:

- Classified units;
- Requirement for greater training availability;

- Back-up units;
- Pros and cons of procuring new PLATO equipment;
- Pros and cons of procuring new audiovisual equipment; and
- Cost comparison of existing and new units.

Classified Units

HQ SAC has indicated a need for a capability within the training system to teach classified subjects such as net identification and classified frequencies. Satisfying this need would require the procurement of additional training system units having TEMPEST capabilities.

The requirement for TEMPEST certified units is currently in dispute. During initial procurement, DCA investigation into TEMPEST shielded rooms for the Viking units found the costs to be too high for the allotted project budget. DCA concurs that TEMPEST terminals would enhance the capability of the training system, but does not agree that the units are essential. Other ACCSs outside of SAC also do not agree that TEMPEST approved units are a necessity. A decision to acquire TEMPEST certified units will have to be made based on the justification provided by HQ SAC.

Requirement for Greater Training Availability

In addition, the ACCSs have indicated a generalized requirement for more units to augment their training capabilities. More units would provide greater training system availability. Current users anticipate that future full utilization of the training system will necessitate the acquisition of one more unit per ACCS to meet increased usage demands.

Back-up Units

Additional training system units would also provide a back-up capability should one of the units at an ACCS fail and require off-site repairs or a delay before it could be repaired on-site. As mentioned earlier, the possibility of off-site or delayed on-site repairs is a major concern of users since PLATO/SPIRITUS training would cease in the interim.

Pros and Cons of Procuring New PLATO Equipment

If the Air Force decides to procure additional units, a good opportunity will exist to acquire units with greater capability. An example of such a technologically advanced unit is the CDC PLATO Personal Training Station, Stand-Alone Author and De-

livery Station (PPTS). PPTS offers many improvements over the current Viking terminal. These improvements can be summarized as follows:

- Greater memory capability;
- Optional hard disk drive;
- Industry standard disk size;
- IBM microcomputer compatability;
- Built-in stand-alone authoring capability designed for nonprogrammer authoring;
- Better random accessing; and
- Potential for built-in TEMPEST capability.

Greater memory and an optional hard disk drive are examples of improvements in technology since the Viking 721 units were acquired by DCA. In general, most newer microcomputers have superior memory capability than the original PLATO equipment. A further enhancement is a built-in hard disk drive that would allow sophisticated software to run on the PPTS system at greater processing speeds.

An industry standard disk size and IBM microcomputer compatibility of the PPTS are results of the increasing standardization of computer devices to the equipment and procedures of IBM, an industry leader. Such capabilities allow more cross-utilization of courseware and increased versatility of the hardware.

The built-in authoring capability allowing non-programmer courseware development of the PPTS is an especially useful feature. The Air Force is moving in the direction of user written courseware, creating the potential for saving substantial courseware development costs. In addition, built-in authoring does not entail mainframe subscription costs, a cost currently necessitated by the Viking equipment.

Better random accessing, another improvement, would help solve a problem at the ACCSSs. Presently, a student must repeat, from the beginning, any lesson not previously completed. Better random accessing would both save time and reduce student frustration.

A final advantage of PPTS equipment is the capability for TEMPEST signal supression shielding to be built into the unit. This avoids costly shielding of the room where equipment is located, if classified instruction of training systems proves to be necessary.

There are some disadvantages to the procurement of additional units. The Viking terminals that are currently used in the training system will be going out of production in early 1986, and will probably not be available in 1987. The addition of units different from existing training system equipment will require certain disk conversions. All current courseware disks would have to be cross-loaded onto industry standard size disks if the additional units are to be courseware compatible with the existing units. Both disk sizes would also have to be produced for future courseware. Even with these compatibility ensuring conversions, classified courseware, if developed, could not run on existing non-TEMPEST Viking units. If courseware is not compatible between both types of units, a balanced use of each type of unit would be necessary to avoid inefficiency. Managers would have to plan and monitor unit usage and courseware development accordingly.

If the Air Force decides to avoid standardization problems by replacing existing equipment completely, the result would be the disposal and replacement of the Viking equipment acquired by DCA at a cost of \$150,000. This action is not recommended until either an Air Force policy standardizing training systems is developed, or the existing training system is no longer able to meet operational requirements.

Pros and Cons of Procuring New Audiovisual Equipment

Up to this point, the discussion of additional hardware units has been concerned with the microcomputer side of the equipment issue. Another potential hardware upgrade to be considered is the replacement of SPIRITUS audiovisual equipment with interactive video disk equipment. There are advantages and disadvantages to the use of either type of equipment.

Interactive video disks offer the potential advantages of greater general reliability and less maintenance than SPIRITUS equipment. This is important since the reliability of the SPIRITUS equipment has been a complaint of training system users. In addition, video disks offer the capability of higher audio clarity, the greater visual capabilities of motion pictures, and higher resolution graphics.

Among the disadvantages of an interactive video disk is a conversion problem. SPIRITUS can operate on both types of units (PPTS and Viking), whereas interactive video disk only operates on PPTS. To use existing courseware on additional units with interactive video disk would necessitate complete redevelopment of the existing audiovisual portion of courseware. Another disadvantage of interactive video disk is that development costs would be greater than for SPIRITUS and would always require contracting. A final disadvantage is that interactive video disk is not as easily modified as SPIRITUS audiovisuals. Any required moderate or major modifications to interactive video disk audiovisuals would entail total redevelopment.

Cost Comparison of Existing and New Units

Cost estimate comparisons and options for the PPTS versus the Viking 721 units, including SPIRITUS and video disk data are presented in Appendix B. PPTS and interactive video disk cost estimates are presented in current year dollars based on information received from CDC. Considering its improved capabilities, the PPTS hardware cost is relatively inexpensive when compared to Viking costs. Since PPTS is designed for non-programmer courseware development, other savings are possible. An addition of an interactive video disk to PPTS would offset some of these courseware development savings. Built-in TEMPEST costs for PPTS (\$3500/unit) are much less than for adapting existing unclassified Viking terminals to TEMPEST approval, since the Viking equipment would have to be disassembled and shielded component by component. TEMPEST shielding of SPIRITUS equipment is not believed to be necessary. No formal decision on this matter has been made.

Cost projections for TEMPEST approved PPTS units with SPIRITUS interfaces are included in Appendix A in the sample funding documentation. Additional terminals are projected for FY 1989 to coincide with the MILSTAR program.

Strategy

The following are recommended actions that relate to the procurement of additional hardware units.

1. A decision must be made on the necessity of TEMPEST-approved terminals for classified instruction. Additional units may also be desirable to provide adequate training availability. Justification for any new terminals should be documented in an Information System Requirements Document (ISRD). HQ SAC would take the lead if TEMPEST terminals are required. System utilization records at the ACCSSs should be reviewed to verify a need for greater training availability.
2. The ACCSSs should not receive a full authoring capability with new terminals due to the potential for jeopardizing standardization.
3. If new hardware is being considered, the pros and cons of additional units should be weighed against future hardware and software development costs.

MINOR HARDWARE AND SOFTWARE ENHANCEMENTS

Issue/Potential Problem

Printers and external speakers are among several of the smaller hardware enhancements suggested by the ACCSs. Printers would permit hard copies of student test scores and instructor-written questions. Therefore, they would be valuable for record-keeping and test editing purposes. An external speaker would allow broadcasting of a lesson to a group of instructors or students for illustration or collective training purposes. Printers are included in the cost of additional terminals in Appendix A. External speakers are inexpensive and have already been installed by some of the ACCSs.

Altering the close proximity of knobs, dials and switches to each other on the PLATO touch sensitive screen may be another desirable training system enhancement. The current crowded screen causes student test score errors due to occasional inadvertant triggering of wrong dials, etc. Unfortunately the current screen size of existing equipment cannot be expanded. Possible solutions to this problem should be weighed against the importance of demonstrating the entire relative positioning of communications systems equipment features on the screen.

Another potential software design improvement is an improved recordkeeping capability. Producing a history of student progress, including the number and type of repeated tests and lessons, and answers to individual test questions is information not presently available but highly desirable.

Strategy

1. Printers should be considered a valuable enhancement to the training system regardless of decisions on acquisition of new terminals. External speakers should also be acquired.
2. The problem of a crowded touch sensitive PLATO screen should be investigated further and rectified through programming, if possible.
3. An improved recordkeeping capability should be acquired for new terminals or programmed into future courseware, if feasible. Manual records of student progress and system usage should be kept until then.
4. Periodic surveys of ACCS software and hardware equipment enhancement requirements should be conducted by ATC.

CHAPTER 4

IMPLEMENTATION ISSUES

INTRODUCTION

This chapter describes the remaining issues that are involved in the integration of the PLATO/SPIRITUS Training System into the Air Force. These issues are important for decision-makers to consider in making a final decision to accept the training system for implementation. Topics covered in discussion of the implementation issues are:

- User acceptance of the system;
- Funding projections;
- Present utilization of the system;
- Program evaluation and monitoring/feedback;
- Implementation of system transfer; and
- Addition of the system to the Table of Allowances.

USER ACCEPTANCE OF THE SYSTEM

A strong need for the training system has been expressed by the ACCSSs, based on their experience with the system during the trial phase and their participation in courseware development. Only the 1st ACCS expressed a reservation based on its concern that future courseware may not reflect its unique training requirements.

User system experience was limited at the time of implementation analysis due to the recent arrival of most of the courseware. It is assumed, however, that the ACCSSs have adequate knowledge of the training system to make an informed judgment.

In conclusion, strong user acceptance of the training system exists. This factor should weigh heavily as a determinant in the training system transfer decision.

FUNDING PROJECTIONS

System transfer from DCA is dependent on an Air Force commitment to assume all future costs and funding responsibilities. Air Force funding projections have been made through FY 1992 and include the following:

- Hardware maintenance for existing Control Data Corporation equipment and SPIRITUS equipment (8 stations);

- Software maintenance of existing courseware (40 hrs);
- Courseware modifications to existing courseware;
- New courseware development generated by PACER LINK II; and
- Hardware expansion.

Projections of and assumptions underlying these costs and Program Decision Paper sample documentation are provided in Appendix A. In addition, these maintenance and additional unit procurement topics are discussed in Chapter 3.

Plans for ongoing maintenance of software and for future courseware development will be presented in the upcoming Life Cycle Management report.

PRESENT UTILIZATION OF THE SYSTEM

Issue/Potential Problem

Many ACCSs have not yet utilized the full potential of the training system. Some instructors and students are not yet proficient or knowledgeable in the operation of the training system. None of the ACCSs have completed their task of preparing, inputting, and editing test questions as part of the training system's courseware development. Local utilization programs for the training system have not been formally established or enforced. Some uncertainty exists as to how the training system is to fit into overall, unit-level training programs.

To some extent, incomplete utilization is expected during a trial phase of implementation of a training product. Initial demands to learn and operate the system are great and the experience is not yet there to accommodate efficient operation. In order to fully integrate the training system and use it to its maximum potential however, measures must be taken to ensure that full utilization will occur and will be formally regulated.

More training of users will probably be needed before a goal of full utilization can be achieved and before peak efficiency of the training system can be realized. Instructors generally are teaching themselves the fairly simple basic operations of the system by referring to the courseware user's manual and to the internal prompts and instruction of the courseware. The test question portion of the courseware for which each ACCS is responsible is proving to be far more difficult and time consuming to master and accomplish than this basic operations training. Unit instructors have no prior skills in preparing test questions for an automated training system. In addition, no formal training in this area has been available. The ACCSs did not anticipate the

burden local test preparation would place on training operations. They chose to locally tailor test questions rather than standardize them, even though courseware is standardized. This decision may have to be reevaluated in light of recent experience.

WWABNCP students too must train before using the training system efficiently since they receive their first orientation to computer-based training on the PLATO/SPIRITUS Training System. Without prior experience students must be taught the operation of the system by unit level instructors.

Strategy

The test preparation/standardization issue should be decided at the Air Staff level with input from ATC and the ACCSS. If unstandardized testing is retained, strategy (1) is recommended. If standardized testing is decided, strategies (2) or (3) are options that may be taken.

1. Test questions will remain unstandardized. ATC will train instructors in expedient and effective methods of test preparation.
2. Test questions will be standardized and written by SMEs appointed by the ACCSS. ATC will train these SMEs in expedient and effective ways to prepare test questions.
3. Test questions will be standardized and written by the courseware developer (whether ATC or contractor).
4. ACCSS will develop utilization plans for their PLATO/SPIRITUS Training System.

Utilization plans should include, but are not limited to, the following information:

- A general description of how PLATO/SPIRITUS training is to fit into unit level training;
- The temporal availability and physical location of the system;
- A description of schedules, logs, etc. which control and monitor the use of the system;
- A description of the types of trainees or operators using the training system;
- A list of the mandatory PLATO/SPIRITUS lesson segments for each group of trainees/operators;

- A statement of priorities for trainee, operator and instructor use;
- Standards for successful completion of a PLATO/SPIRITUS course for each group of trainees/operators;
- A statement of the impact of successful completion of PLATO/SPIRITUS training on certification and recertification status;
- A description of how and under what circumstances instructor training will supplement PLATO/SPIRITUS training; and
- Standards for instructor use of the system (approved purposes, frequency, schedule, priorities).

These utilization plans will be reviewed by ATC and Air Staff.

5. ATC in coordination with Air Staff OPR and OCR should prepare written guidelines and policies for the overall training system program, based on user utilization plans. They should set a final deadline for full utilization and define utilization standards system-wide. Further discussion about utilization standards will be included in the Life Cycle Management report.
6. Air Staff policies and guidelines will be the basis for ACCSS' preparation of local operating instructions for the training system.

PROGRAM EVALUATION AND MONITORING/FEEDBACK

Issue/Potential Problem

After integration and full utilization of the training system, an objective evaluation should be conducted. This evaluation would inform decision-makers of the effectiveness and efficiency of the training program in meeting its intended purposes. An evaluation of this kind is limited by the data available. Thus the evaluation would probably not be able to specifically measure any improvements in operational effectiveness caused by the use of the training system. The POLO HAT exercises are operational events and cannot be experimentally controlled. The results of the exercises are top secret and access to the data will be strictly limited. There are, however, many important indicators of success that can probably be measured within the sources of information available and with reasonable accuracy and reliability. For instance, measuring the degree to which the training system reduces training time is important since the system is

viewed as a cost and labor saving device. Finally, at least a modified cost-benefit analysis would seem feasible.

Concerning monitoring and feedback, the ACCSSs should routinely keep records of training system usage, individual student use and progress, student problems, schedules, and successes and failures. Because of the limitations of the automatic record-keeping capability of the training system, some records will have to be kept manually. They should be uniform and should be used for both routine statistical reporting to ATC and for program evaluation purposes.

Strategy

This series of actions when implemented will provide a means to evaluate the training programs and to establish routine monitoring/feedback.

1. An evaluation plan should be developed and conducted. The evaluation plan should provide a thorough description of its objectives and its methodology. Specifically the plan needs to address the following areas:
 - Objectives of the evaluation
 - Key variables
 - Data collection strategies
 - Method of analysis
 - Required timeframes.
2. ACCSSs should keep daily logs of the following data for monitoring and feedback purposes:
 - Date
 - Student user identification
 - Student status
 - Lesson segment(s) covered
 - Test(s) taken
 - Test scores
 - Exact time when used.

IMPLEMENTATION OF SYSTEM TRANSFER

A message from Air Staff to DCA/CCSO project leader is all that is required to transfer the training system from one agency to another. The message should state the following:

- AF accepts lead MILDEP status;
- AF will assume any future expansion costs, and ongoing maintenance and operational support of the training system;
- AF accepts the hardware equipment and software residing at the ACCSS in their behalf;
- AF wants the two authoring stations and all relevant programming documentation shipped to Keesler Air Force Base (AFB);
- All remaining courseware and user system documentation should be shipped to the ACCSS;
- AF wants an inspection and checking of the authoring stations to verify good operating condition during installation at Keesler AFB; and
- AF is submitting an inventory list of all hardware, software and training system documentation included in the transfer (Table 4-1).

Table 4-1 lists all the hardware, software, and documentation that would change ownership from DCA to the Air Force during system transfer. Also indicated is the equipment/software/documentation not presently at an Air Force base location. This equipment/software/documentation is located at ESI, the courseware developer, and arrangements should be made with DCA to ship authoring stations, peripherals and programming documentation to Keesler AFB, and remaining courseware and training system documentation to the ACCSS.

ADDITION OF THE SYSTEM TO THE TABLE OF ALLOWANCES

Issue/Potential Problem

An essential step in the integration of PLATO/SPIRITUS Training System equipment is proper documentation of all the hardware for Air Force users. Since the equipment has been acquired in a method different from routine Air Force acquisition procedures, a requirement must be established for the equipment in the Table of Allowances (TA) and reflected in applicable equipment accountable registers. This approach is important for two major reasons. First, it establishes a requirement for the training system equipment when update, replacement or augmentation is necessary. Second, it establishes both accountability and responsibility for this important and expensive equipment.

TABLE 4-1

**INVENTORY OF EQUIPMENT AND SYSTEM DOCUMENTATION
FOR TRANSFER OF PLATO/SPIRITUS TRAINING SYSTEM**

<u>SUPPLIES</u>	<u>QUANTITY</u>
Model 721-31 Viking Terminal -60 Hz (2) ¹	7
Model 721-31 Viking Terminal -50 Hz	1
Model 721-101 Modem ¹	2
Model 110YC-AHA Primary Disk Drive(2) ¹	8
Model 110YC-AHB Secondary Disk Drive ¹	2
Model 726-20 Printer ¹	1
Model 799-50 Printer Cable ¹	1
Model 721-201 Parallel Port Options(2) ¹	8
Model 721-200 Dual RS 232 Ports(2) ¹	8
SPIRITUS Drive/Editor ¹	1
 Metatron author single screen (13" x 13") domestic station, complete with random access projector, handset, combination microphone-headset, Viking interface cable and authorizing manual. ¹	 2
 Metatron service manual complete with schematic drawings. ¹	 1
 Metatron single screen (13" x 13") domestic (110 VAC 60 Hz) student station, complete with random access projector, handset, headset, Viking interface cable and operations manual.	 5
 Metatron E single screen (13" x 13") export (220 VAC 50 Hz) student station, complete with random access projector, handset, headset, Viking interface cable and operations manual.	 1

¹ Equipment/software/documentation to be shipped by DCA to Air Force. Equipment/software/documentation not footnoted is located at Air Force bases. Ownership has to be transferred for former and latter groups. Numbers in parentheses indicate the number to be shipped, in cases where the full quantity is not shipped.

<u>SUPPLIES</u>	<u>QUANTITY</u>
Metatron maintenance kits, consisting of most used small items, such as projector lamps, fuses, azimuth adjustment tape, wrenches, extender board, test cables, lubricants and cleaning supplies.(1) ²	7
Metatron spareboard parts kit	6
Courseware for the following courses: ³	6 sets of master and backup disks, slides, and audio cassettes
AFSATCOM (6 lesson segments)	
LF/VLF (5 lesson segments)	
HF (4 lesson segments)	
UHF/ARA-60 (6 lesson segments)	
ARC-171	
TWA	
Separate checklists for 1st ACCS	4
Programming code and in-line documentation for all courses ²	N/A
Airborne Command Post Communications System User's Manuals	6
Airborne Command Post Communications System Maintenance Manuals ²	6

² See note 1.

³ Most courseware has been delivered with the exception of ARC-171, TWA and some initial courseware.

Strategy

This subsection contains a list of steps to follow in entering the training system into the Table of Allowances.

1. The first activity in ensuring proper training system documentation is naming a MAJCOM for taking the training system through the process of establishing a requirement for the system on the TA. ATC will act as the lead MAJCOM for this activity. ATC is the best MAJCOM to undertake this responsibility because of its major role in training system upkeep; its prospective ownership of PLATO authoring stations; and its generic command mission of training.
2. The decision to allow the training system to be placed on the TA will be made by Warner Robbins Air Logistics Center/MMME. This section deals with allowances for the training system. WRALC/MMME will approve or disapprove introduction of the training system into the TA based on the legitimacy of the requirement. Due to the high priority of the subjects the training system deals with, the established need for the equipment, and the current existence of the equipment in Air Force units, approval of the training system for the TA is not anticipated to be a problem.
3. The PLATO/SPIRITUS equipment will be placed on the accountable registers of the organizations authorized to have it by the TA. To accomplish this, a transaction code of "FED" will be entered into the accountable equipment system together with the identifiers for the existing equipment. This code is designed to identify and establish accountability for equipment already in use in the Air Force, but not documented. Use of the code allows the bypassing of financial accounting records so that the receiving unit will not be charged for the equipment. This action will be accomplished on each base where PLATO/SPIRITUS equipment is being used and will be overseen for accomplishment by the user organization.

CHAPTER 5

IMPLEMENTATION PLAN

INTRODUCTION

This chapter provides a plan for the system transfer decision and for initial integration of the PLATO/SPIRITUS Training System into the Air Force. The actions found in the plan are derived from the short-term strategies to implementation problems and issues discussed in Chapters 2, 3 and 4. The plan consists of a table of tasks, corresponding action offices, and dates for completion, and is organized in order of proposed sequence.

IMPLEMENTATION TASKS

The purpose of the implementation tasks, responsible organization assignment, and completion dates is to provide an orderly framework for accomplishing the activities necessary for orderly integration of the training system. All of this information is shown on Table 5-1. Responsible organizations have been chosen based on the stated organizational roles of the training system delineated in Chapter 2.

The first task is the review of all documents produced in the study (of which this report is a part) and a decision on whether to accept ownership of the training system from DCA. The second task is sending formal documentation to DCA to relay the transfer decision. These tasks begin the implementation process by placing the training system in the ownership of the Air Force. Chapter 4 discusses system transfer issues in detail.

The third and fourth tasks deal with the roles and responsibilities for funding, operation and maintenance of the training system, and coordinating these roles with field and staff operating agencies responsible for implementing them. The roles assigned are based on the organizational responsibilities described in Chapter 2. That chapter also describes the process of dissemination of information to the appropriate agencies.

Task five satisfies the requirement for establishing equipment accountability for the training system hardware and software. The description of the procedures to be used in placing the training system on the Table of Allowances is in Chapter 4.

Tasks six, seven and eight taken together are the process of developing guidelines on how the training system is to be used. This issue was explained in Chapter 4 under present utilization of the system. In task six, utilization plan inputs are developed by each of the ACCSS and forwarded to HQ ATC. HQ ATC and HQ USAF functions develop a series of overall guidelines based on ACCSS input in task seven. In task eight, the ACCSS prepare their own operating instructions in accordance with the established guidelines.

TABLE 5-1

**PLAN FOR SYSTEM TRANSFER AND
INITIAL AIR FORCE INTEGRATION**

TASK	RESPONSIBLE ORGANIZATION	COMPLETION DATES (DURATION)
1. PLATO/SPIRITUS implementation reports are studied and a final decision is made to accept ownership and lead MILDEP status for the PLATO/SPIRITUS Training System from DCA	HQ USAF/SIMC HQ USAF/DPPT (JOINT)	1 March 1986
2. Formal document sent to DCA accepting the PLATO/SPIRITUS Training System and lead MILDEP status, and specifying hardware, software and documentation inventory and remaining Air Force responsibilities.	HQ USAF/SIMC	1 March 1986
3. Formal policies are established and coordinated for funding software and hardware maintenance of the PLATO/SPIRITUS Training System, as well as acquisition of new hardware and software. In addition, organizational roles in the operation and maintenance of the PLATO/SPIRITUS Training System are fixed.	1. HQ USAF/SIMC (DECISIONS) 2. HQ USAF/DPPT HQ USAF/XOOTS HQ USAF/RDSS MAJCOMs HQ ATC ACCSS (ADVISEMENT)	1 April 1986 (1 Month)
4. PLATO/SPIRITUS implementation reports and responsibilities for PLATO/SPIRITUS Training System funding, operation and maintenance are disseminated to MAJCOMs (including ATC), ACCSS and involved Air Staff organizations. All organizations respond with memoranda of understanding for their roles in the PLATO/SPIRITUS environment.	1. HQ USAF/DPPT (DISSEMINATION) 2. HQ USAF/XOOTS HQ USAF/RDSS MAJCOMs HQ ATC ACCSS (RECEIPT AND RESPONSE)	1 May 1986 (1 Month)
5. PLATO/SPIRITUS equipment is placed on the Table of Allowances and equipment registers.	HQ ATC ACCSS	1 July 1986 (2 months)
6. Utilization plan inputs are prepared and submitted to ATC.	ACCSS	1 July 1986 (2 months)

TASK	RESPONSIBLE ORGANIZATION	COMPLETION DATES (DURATION)
7. Overall guidelines and policies for the use of the equipment are developed.	1. HQ USAF/SIMC HQ USAF/DPPT (DECISIONS) 2. HQ ATC (ADVISEMENT)	1 September 1986 (2 months)
8. Local operating instructions are prepared for PLATO/SPIRITUS Training System use based on established overall guidelines.	ACCSS	1 October 1986 (1 month)
9. Decision made on whether ACCSS will standardize testing.	HQ ATC HQ USAF/SIMC HQ USAF/DPPT (JOINT)	1 October 1986 (2 months)
10a. If ACCS testing is to be standardized:		1 February 1986 (3 months)
1. SMEs are appointed and trained in test development and input; or	ACCSS (APPOINTMENT) HQ ATC (TRAINING)	
2. The courseware developer prepares tests on courseware material	Courseware Developer (ATC or other)	
b. If ACCS testing is not to be standardized, then instructors are trained in test preparation and input on the PLATO/SPIRITUS Training System.	HQ ATC (TRAINING)	
11. Full utilization of the PLATO/SPIRITUS Training System is mandated.	HQ USAF/SIMC	1 March 1987

Tasks nine and ten concern the process of the Air Force deciding whether or not to standardize testing. In task nine, decision-makers determine if testing conducted on the training system is to be standardized. Alternative subtasks are provided in the circumstances of a decision for either standardized or non-standardized testing. This issue was covered in Chapter 4 under present utilization of the system.

Task eleven, the final task, is the notification from HQ USAF that use of the training system is mandatory. After determining that all of the implementation tasks have been carried out, HQ USAF agencies will direct that the training system is to be employed in accordance with the established guidelines.

The last column on Table 5-1 proposes dates of completion for each task and expected durations. Implementation begins when responsible agencies review documentation and make an acceptance decision for the training system.

DESIRED OUTCOMES OR SUCCESS INDICATORS FOR THE IMPLEMENTATION PLAN

If the implementation plan is successful the following outcomes will be achieved:

- An Air Force decision to accept transfer of training system from DCA;
- Formal agreement on training system organizational roles and funding responsibilities;
- An Air Force decision for/against standardized training system testing;
- Standardized training system utilization plans;
- Local operating instructions regulating base level training system utilization;
- Delivery of remaining equipment, courseware and documentation to AF;
- Entry of training system on Table of Allowances and equipment registers; and
- Full utilization of the training system.

RESOURCES NECESSARY FOR SUPPORTING IMPLEMENTATION PLAN

The staff time necessary for fulfilling implementation plan actions is the only resource necessary for supporting the implementation plan.

Outlays for hardware and software maintenance and additional unit procurements are life cycle management resources. These actions are not included in the implementation plan but will be discussed in the Life Cycle Management Report. Cost estimates for these expenses are in Appendix A.

MONITORING AND FEEDBACK OF IMPLEMENTATION PLAN ACTIVITIES

HQ USAF/SIMC and HQ USAF/DPPT are the primary agencies needing information about the progress of the implementation plan. These primary agencies set the start date for implementation plan activities. Responsible organizations listed in Table 5-1 will report to primary agencies on their results in written messages by the end of their allotted time for executing actions. Table 5-1 lists task completion dates.

APPENDIX A
SAMPLE FUNDING DOCUMENTATION

APPENDIX A

SAMPLE FUNDING DOCUMENTATION

This appendix presents a sample Program Decision Paper that can be used in future funding support of the PLATO/SPIRITUS Training System. The Program Decision Paper contains information needed for presenting training system requirements for future funding approval. The Program Decision Paper consists of a brief narrative description of the program, funding requirements by program element code for fiscal years 1986-1992, and three attachments. Attachment 1 provides a more detailed narrative of the significance of the program and the ramifications of non-funding. Attachment 2 provides a summary table relating cost estimates by type of program expense for fiscal years 1986-1992. Finally, Attachment 3 provides a cost detail paper explaining the assumptions underlying program costs depicted in the two cost tables.

All cost estimates are provided in current dollar values, unadjusted for inflation. Cost estimates were derived from various sources.

Hardware contract maintenance and hardware expansion estimates were provided by Control Data Corporation (PLATO equipment) and Fowler Associates (SPIRITUS equipment). Routine courseware modification estimates and PACER LINK II estimates were based on information provided by ESI (the current courseware developer), the Air Force Air Traffic Controller PLATO application, HQ SAC and the ACCSS. Finally, Control Data Corporation and in-house estimates are used for software maintenance estimates. Courseware modification and new development costs represent only contractor costs and assume these efforts will be contracted until FY 1992. Air Force costs not included but expected in contracted courseware developments would include Air Force SME time, materials and associated travel costs. Air Force SMEs would be expected to prepare and provide a finalized and approved standardized lesson plans to the contractor for contractor scripting and programming. Thus the major front-end work in courseware development would be accomplished by the Air Force and is not represented in the funding estimates.

**WWABNCP COMPUTER-BASED TRAINING
PROGRAM DECISION PAPER**

DESCRIPTION: Worldwide Airborne Command Post (WWABNCP) training for Communications Systems Operators (CSOs) requires funding for maintenance of existing eight PLATO/SPIRITUS Training System units and of 40 hours of existing courseware. Funding would also be provided for an additional 53 hours of courseware development and related courseware maintenance in FY 1987 and FY 1988 to support the PACER LINK II aircraft modification program. Finally, funding would provide the capability for classified training dictated by MILSTAR program training requirements. Classified training would include stand-alone, TEMPEST certified, six student delivery stations and two authoring stations procurement in FY 1989.

ONE-LINER: Funds courseware development, hardware expansion and maintenance for the WWABNCP PLATO/SPIRITUS Computer-Based Training System

PROGRAM
MONITOR: Mr. Sumrall HQ USAF/DPPTS X57321

WWABNCP COMPUTER-BASED TRAINING PROGRAM

PURPOSE: Funding is required for computer-based training program to improve strategic connectivity by improving the performance of communications systems operators on EC-135 and E-4B aircraft at Worldwide Airborne Command Posts (WWABNCP).

- DCA funded and developed this system to augment ground training for Airborne Command and Control Squadrons (ACCSs).
- AF assumes the responsibility for follow-on maintenance, operation and future development.
- Follow-on maintenance includes hardware maintenance of existing eight PLATO/SPIRITUS Training System units and software maintenance of 40 hours of existing courseware.
- An additional 53 hours of courseware development would be generated in FY 1987 - 1988 by PACER LINK II.
- A capability for classified training requiring stand-alone, TEMPEST-certified, six student delivery stations and two authoring stations would be dictated by MILSTAR program in FY 1989.

BACKGROUND: JCS documented a need to improve strategic connectivity by improving performance of communication system operators by providing increased equipment familiarization and procedural training.

JUSTIFICATION: ACCSs must be trained on mission execution, control and operational procedures to provide a survivable command and control capability where mission execution and direction of SIOP forces are affected.

- ACCS's training is constrained by:
 - Limited number of aircraft available for inflight and ground alert training.
 - Limited instructor availability and inadequate training facilities.
- Training constraints result in overcrowded training flights hampering mission training quality.
- Insufficient classroom instruction and pre-flight practice reduce the quality of ground training and in-flight training missions.

- PLATO/SPIRITUS Training System provides standardized, comprehensive equipment familiarization and procedural training.
- PLATO/SPIRITUS is used for extensive ground training. PLATO/SPIRITUS provides an excellent simulator for basic indoctrination.
- Improvements to ACCS training programs were stated as:
 - Improved ground training program by providing adequate preflight training;
 - Comprehensive continuation training for qualified operations;
 - Standardization of lesson plans to ensure quality content; and
 - Reduction in in-flight training time and instructor workload.

IMPACT IF NOT FUNDED: The PLATO/SPIRITUS Training System cannot be maintained if no funding is provided.

- Courseware based on aircraft operational procedures and actual equipment must be updated to maintain currency and consistency with actual operations.
- Elimination of this ground training supplement would further hamper in-flight training missions and ultimately reduce operational performance.

**WWABNCP COMPUTER-BASED TRAINING PROGRAM
PROGRAM DECISION PAPER COST TABLE**

(by fiscal year, in thousands of current year dollars)

TOA		<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>
		<u>\$161</u>	<u>\$481</u>	<u>\$486</u>	<u>\$536</u>	<u>\$346</u>	<u>\$346</u>	<u>\$346</u>
84772f	Training Developments	161	161	161	176	176	176	176
3400	Operation and Maintenance	161	161	161	176	176	176	176
	Other Purchased Services	161	161	161	176	176	176	176
11321f	PACCS/WWABNCP SYS EC-135 CLV MODS	0	320	325	170	170	170	170
3400	Operation and Maintenance	0	320	325	170	170	170	170
	Other Purchased Services	0	320	325	170	170	170	170
11312f	PACCS/WWABNCP SYS EC-135 CLV MODS	0	0	0	47	0	0	0
3080	Electronic & Telecommunications Equip.	0	0	0	47	0	0	0
	Electronic & Telecommunications Equip.	0	0	0	47	0	0	0
32015f	NEACP/E-4B CLV MODS	0	0	0	24	0	0	0
3080	Electronic & Telecommunications Equip.	0	0	0	24	0	0	0
	Electronic & Telecommunications Equip.	0	0	0	24	0	0	0
21117f	Airborne Command Post (CINCEUR)	0	0	0	24	0	0	0
3080	Electronic & Telecommunications Equip.	0	0	0	24	0	0	0
	Electronic & Telecommunications Equip.	0	0	0	24	0	0	0
21118f	Airborne Command Post (CINCPAC)	0	0	0	24	0	0	0
3080	Electronic & Telecommunications Equip.	0	0	0	24	0	0	0
	Electronic & Telecommunications Equip.	0	0	0	24	0	0	0
21120f	Airborne Command Post (CINCLANT)	0	0	0	24	0	0	0
3080	Electronic & Telecommunications Equip.	0	0	0	24	0	0	0
	Electronic & Telecommunications Equip.	0	0	0	24	0	0	0
84772	Training Developments	0	0	0	47	0	0	0
3080	Electronic & Telecommunications Equip.	0	0	0	47	0	0	0
	Electronic & Telecommunications Equip.	0	0	0	47	0	0	0

WMABNCP COMPUTER-BASED TRAINING PROGRAM

SUMMARY BREAKOUT

(by fiscal year, in thousands of current year dollars)

	1986	1987	1988	1989	1990	1991	1992
<u>Existing Maintenance and Routine Courseware Modifications</u>							
Hardware Maintenance	15	15	15	15	15	15	15
Software Maintenance	26	26	26	26	26	26	26
Courseware Modifications	120	120	120	120	120	120	120
Subtotal	161	161	161	161	161	161	161
<u>PACER LINK II Courseware</u>							
New Courseware Development	0	320	320	0	0	0	0
Courseware Modifications	0	0	0	160	160	160	160
Software Maintenance	0	0	5	10	10	10	10
Subtotal	0	320	325	170	170	170	160
<u>Hardware Expansion *</u>							
ACCS Units (6)	0	0	0	138	0	0	0
Authoring Stations (2)	0	0	0	50	0	0	0
Hardware Maintenance	0	0	0	15	15	15	15
Subtotal	0	0	0	203	15	15	15
TOTAL	161	481	486	536	346	346	346

*Includes TEMPEST approved CDC units. A requirement for TEMPEST approved SPIRITUS equipment does not yet exist.

**Numbers may not add to totals due to rounding.

**COST DETAIL PAPER
WWABNCP COMPUTER-BASED TRAINING PROGRAM COST ESTIMATES
(IN CURRENT YEAR DOLLARS)**

To maintain the PLATO Computer-Based Training System as a viable training aid for the Worldwide Airborne Command Post Communications Systems Operators the following calculations are provided:

**EXISTING TRAINING SYSTEM MAINTENANCE AND ROUTINE
COURSEWARE MODIFICATIONS (Source: CDC, SPIRITUS)**

Hardware Maintenance

\$15,360
(Annually)*

- Hardware maintenance for existing Control Data Corporation equipment and SPIRITUS equipment (8 units)
- Maintenance charges include contracts, covering equipment repair parts and labor.
 - Maintenance contract for each Control Data Corporation PLATO unit is \$91.00 per month per unit \$ 8,736
(Annually)
 - Maintenance contract for each SPIRITUS unit is \$69.00 per month per unit \$ 6,624
(Annually)

Software Maintenance of Existing Courseware (40 hours) (Source: CDC, in-house)

\$26,400
(Annually)

- Software maintenance includes duplication and distribution of disks, slides and cassette tapes from master copies owned by USAF. (Does not include modifications or updates to courseware)
 - Software maintenance requires the use of authoring terminal, hence the availability of or subscription to CYBER mainframe computer
 - Subscription to Control Data Corporation CYBER mainframe computer \$800 per month per authoring terminal \$19,200
(Annually)

* Ongoing costs are indicated as "annually". All other costs are one-time costs.

- Labor charges and program management costs are projected at \$15.00 per month per courseware hour (\$600.00 per month for 40 hours of courseware maintenance) \$ 7,200
(Annually)
- Maintenance of additional courseware is accounted for in computations for additional courseware development

Courseware Modifications (40 hours) (Source: ESI, DCA, Air Traffic Controllers PLATO Application, HQ SAC, ACCSS)

\$120,000
(Annually)

- Courseware modifications are:
 - Driven by JCS procedural changes and by Technical Order changes that significantly impact courseware
 - Projected annually impacting one-fourth of courseware (10 hours)
- The complexity of courseware modifications is dependent on:
 - Number of changes in total courseware
 - Number of alternatives per change (e.g., randomized presentation of scenarios and answers)
- Based on the type and complexity of courseware modifications, the cost per hour of courseware modification is projected at \$12,000
- Courseware modifications required for the existing 40 hours of courseware are projected for 10 hours annually

\$120,000
(Annually)

PACER LINK II COURSEWARE (Source: HQ SAC, ESI, DCA, Air Traffic Controllers PLATO Application)

New Courseware Development Generated by PACER LINK II

\$640,800

- PACER LINK II courseware must be developed to maximize the utility of the PLATO/SPIRITUS Training System and to provide training for the PACER LINK II aircraft modification program
 - Contractor training for PACER LINK II aircraft modification is estimated at 80 hours of classroom instruction

- Computer-based training is projected to reduce classroom training by one-third (based on PLATO applications for School of Health Care Sciences and Air Traffic Controllers)
- Therefore, 53.3 hours of courseware development is projected over two years (FY 87 and FY 88 at 26.7 hours per year) at a cost of \$12,000 per hour \$320,400

PACER LINK II Courseware Modifications

\$159,600
(Annually)

- Additional courseware modification projected at a cost of \$12,000 per curriculum hour
- Technical Order and JCS changes may require one-fourth of the courseware to be modified annually
 - FY 1987 and 1988: No PACER LINK II courseware modifications are projected since courseware development is underway
 - FY 1989: One-fourth of 53.3 hours of PACER LINK II courseware (13.3 hours) is modified at a cost of \$12,000 per hour \$159,600
(Annually)

Software Maintenance

\$ 9,540
(Annually)

- Labor charges and program management costs are calculated for 53 hours of courseware maintenance at a cost of \$15.00 per month per courseware hour

HARDWARE EXPANSION (Source: CDC, SPIRITUS)

ACCS Units and Authoring Stations

\$187,500

- One additional unit scheduled for each ACCS and two units scheduled for additional courseware development in FY 89
 - Based on projected usage and instructor requirements

- Currently, system usage ranges from 12 to 18 hours per day with limited software available; with complete 93 hours available usage is expected to increase and ACCSs will incur scheduling conflicts
- The second unit for each ACCS will provide the ability to run classified curricula (generated by anticipated training requirements of MILSTAR)
 - Stand-alone unit (allow classified curriculum development without purchasing classified communications lines or making provisions for classified mainframe access)
 - Printer for each unit allows the capability to print out student scores and to aid in developing student test libraries
- The cost of the units is based on projected estimates from Control Data Corporation and SPIRITUS for stand-alone classified TEMPEST unit equipment:

CDC PLATO Personal Training Station (Monochromatic Touch Screen)	\$ 4,500
CDC Printer	\$ 420
SPIRITUS Audiovisual Unit	\$13,000
CDC TEMPEST*	\$ 3,500
CDC Additional Memory	\$ 400
SPIRITUS Drive/Editor (A one-time licensing fee for all units)	\$ 5,500
CDC Authoring Software (For authoring units only)	\$ 3,000
- Six additional units and two additional authoring stations are programmed at an average cost per unit of approximately \$22,000 for student delivery units and \$25,000 for authoring units plus the \$5,500 licensing fee	\$187,500

* There is no existing equipment for TEMPEST approved SPIRITUS equipment.

- The cost of screening a room to meet classified requirements was projected at more than \$50,000 per location; hence it was cost prohibitive

Maintenance of Additional Units

\$15,360
(Annually)

- Future maintenance contracts are projected at current rates

- Control Data Corporation equipment at \$8,736 per year \$ 8,736
(Annually)
- SPIRITUS, Inc. equipment at \$6,624 per year \$ 6,624
(Annually)

APPENDIX B

HARDWARE COST ESTIMATES OF ALTERNATIVE TRAINING SYSTEMS

APPENDIX B

HARDWARE COST ESTIMATES OF ALTERNATIVE TRAINING SYSTEMS

Tables B-1 and B-2 contain comparisons of the PLATO Viking 721 and PLATO Personal Training Station (PPTS). Table B-1 shows a comparison of Viking and PPTS student station hardware unit costs. Table B-2 shows a comparison of Viking and PPTS authoring station costs.

The PPTS represents a technological advance over the Viking 721 systems which are currently being employed by the ACCSS. In the case of the student stations (Table B-1), the PPTS already has built-in disk drives, parallel and dual ports and therefore requires no peripheral equipment to perform its basic functions.

The advances in the PPTS are even more pronounced in its authoring configuration (Table B-2). All of the PPTS systems have the potential for stand-alone authoring with the addition of expanded memory and authoring software. The only additional external device necessary is a printer. The Viking 721 system requires substantial external devices to perform authoring functions, and also requires a subscription hook up to a CYBER mainframe computer.

Options for SPIRITUS and interactive video disk equipment are presented with cost figures on Table B-1. This allows users to access assess alternative student training station costs.

TABLE B-1

COMPARISON OF VIKING AND PPTS
STUDENT STATION HARDWARE UNIT COSTS

PLATO VIKING 721		PLATO PERSONAL TRAINING STATION (PPTS)	
VIKING STATION		PPTS STATION	
VIKING 721 TERMINAL	\$ 2,750	PPTS TERMINAL	\$ 4,500
PRIMARY DISK DRIVE	1,895	PER UNIT	\$ 4,500
PARALLEL PORTS	100		
DUAL RS 232 PORTS	190		
PER UNIT	<u>\$ 4,935</u>	OPTION 1	
		SPIRITUS STUDENT STATION (SAME AS	
		FOR THE VIKING 721 TYPE)	<u>\$12,443</u>
		TOTAL SYSTEM PER UNIT COST	
		WITH OPTION 1	<u>\$16,943</u>
SPIRITUS STUDENT STATION			
METATRON	\$ 8,253	OPTION 2	
METATRON MAINTENANCE KIT	390	INTERACTIVE VIDEO DISK STUDENT	
METATRON SPAREBOARD PARTS	3,800	STATION	
	<u>\$12,443</u>	PPTS INTERNAL CONFIGURATION	\$ 3,000
		VIDEO DISK PLAYER	2,000
		NECESSARY SOFTWARE ADAPTION	500
		PER UNIT	<u>\$ 5,500</u>
TOTAL SYSTEM PER UNIT COST	<u>\$17,378</u>	TOTAL SYSTEM PER UNIT COST WITH	
		OPTION 2	<u>\$10,000</u>

NOTES:

1. This table does not include software costs except those applicable to hardware interface and configuration.
2. "Crossloading" costs i.e., costs to convert existing courseware to an industry standard 5 1/4 inch disk used by the PPTS are not included.
3. A highly recommended addition to the PPTS is expanded memory for \$200 (not included). This greater capacity allows the training courseware to run at a faster processing rate.
4. The PPTS system also requires an executor disk at \$50 for each course package produced (not included).
5. Costs to configure the PPTS for SPIRITUS interface are not included and are anticipated to be a one time cost of \$5,500 irrespective of the number of units involved.

TABLE B-2

COMPARISON OF VIKING AND PPTS AUTHORIZING STATION COSTS

PLATO VIKING 721		PLATO PERSONAL TRAINING STATION (PPTS)	
VIKING 721 TERMINALS (2)	\$ 5,500	PPTS TERMINAL (2)	\$ 9,000
MODEM (2)	1,320	PRINTER (1) WITH CABLE	420
PRIMARY DISK DRIVE (2)	3,790	ADDITIONAL MEMORY (NOTE 1)	400
SECONDARY DISK DRIVE (2)	3,326	SPIRITUS DRIVE/EDITOR	5,500
PARALLEL PORT OPTIONS (2)	200	TOTAL	<u>\$15,320</u>
DUAL RS 232 PORTS (2)	380		
SPIRITUS DRIVE/EDITOR (1)	5,500		
PRINTER (1) WITH			
CABLE (NOTE 2)	420		
TOTAL	<u>\$20,436</u>		
MAINFRAME SUBSCRIPTION (NOTE 3)	\$12,000	AUTHORIZING SOFTWARE (NOTE 3)	\$ 6,000
SPIRITUS AUTHORIZING STATIONS (2)	<u>\$17,930</u>	SPIRITUS AUTHORIZING STATIONS (2)	<u>\$17,930</u>
TOTAL FOR TWO AUTHORIZING STATIONS	<u>\$50,366</u>	TOTAL FOR TWO AUTHORIZING STATIONS	<u>\$39,250</u>

NOTES:

1. Expanded memory is required for PPTS authoring stations.
2. A lower cost printer is substituted for printers originally bought for the PLATO VIKING 721 authoring stations.
3. A major feature of the PPTS system is its capacity to perform stand-alone authoring; therefore, the costs of PPTS authoring software have been compared to 24 months of the mainframe subscription costs of the VIKING 721.
4. TEMPER cost is \$3,500 per PPTS system and is expected to be much higher for in-place VIKING 721 authoring stations.
5. This comparison does not include courseware development costs.
6. An option for interactive video disks would delete the cost for SPIRITUS authoring stations and would cost \$11,000 for hardware for two student stations and \$5,000-\$10,000 per course or major update.

END

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